

# Application of Radiofrequency Ablation Fistulization to Treat Bartholin Duct Cysts and Gland Abscesses: A Minimally Invasive Surgical Technique

Xiao Shan Chai<sup>1</sup>, Yong Jing Zhang<sup>1</sup>, and Guang Shi Tao<sup>1</sup>

<sup>1</sup>Affiliation not available

May 5, 2020

## Abstract

Marsupialization and fistulization are current surgical procedures for the treatment of symptomatic Bartholin duct cysts and gland abscesses. Other combined application methods include silver nitrate, carbon dioxide (CO<sub>2</sub>) lasers, aspiration and alcohol sclerotherapy. However, except for Word catheterization, most of these methods are relatively time-consuming and are not associated with low recurrence rates. Here, we describe a minimally invasive surgical technique that involves the application of radiofrequency ablation (RFA) combined with a needle-like knife electrode to fistulize cysts or abscesses approaching treatment.

## Introduction

When conservative treatments fail, symptomatic Bartholin duct cysts and gland abscesses require surgical procedures.<sup>1-3</sup> The earliest report of treatment in a text book until the late 1960s was complete excision of the Bartholin gland,<sup>4</sup> which should be considered when conservative treatments fail<sup>5, 6</sup> and there is a suspicion of Bartholin's carcinoma in patients over 40 years (mainly in menopausal or perimenopausal women).<sup>3</sup> Complications of gland excision should be considered.<sup>2, 5</sup>

Several other surgical techniques have been developed in which the Bartholin gland remains in situ or destroys the cyst wall completely.<sup>2, 7, 8</sup>

The first technique is simple incision and drainage of the cyst or abscess; this is an easy procedure associated with immediate patient relief and a recurrence rate of approximately 13%,<sup>1</sup> but it is not recommended because of the relatively high recurrence rate.<sup>1-3, 9</sup> Nevertheless, a survey on obstetrics-gynaecology residents in 2019 showed an intriguing result: 87% of respondents used incision-drainage for Bartholin abscesses;<sup>10</sup> however, the recurrence and complication rates of this technique have never been evaluated.

The second technique is fistulisation. Early in 1938, Buford Word described this procedure. After several attempts with silk loops, metal rings and V-shaped springs, which were not feasible because of pain experienced during this time, he introduced a catheter that created a new outflow tract for the cyst in 1963, namely, the Word catheter, which has been widely reported to date;<sup>2, 3</sup> however, is not advised for the treatment of deep cysts and abscesses.<sup>1</sup> Another similar approach, placement of a ring catheter (the Jacobi ring), does not risk premature expulsion and has the benefit of creating two drainage tracts.<sup>11</sup>

The third technique is marsupialization or fenestration. In 1950, Jacobson was the first to describe the technique in which sutures are placed between the wall of the cyst and skin, thus creating a new outflow tract.<sup>5</sup> The procedure can be performed under general or local anaesthesia in the operating room<sup>2</sup> and was first used in patients without an abscess<sup>1</sup>; however, it is currently used for both cysts and abscesses.<sup>3</sup>

The fourth technique includes combined application techniques, namely, silver nitrate, carbon dioxide (CO<sub>2</sub>) lasers<sup>2, 7, 12</sup> aspiration and alcohol sclerotherapy.<sup>13</sup>

Except for Word catheterization, most of the current treatment techniques are relatively time-consuming, with more steps than surgical procedures, and the recurrence rates range from 3.8 to 20%<sup>2-3, 12, 14</sup> and can even reach as high as 37% (abscesses reported in 2013).<sup>6</sup> Although there are different opinions,<sup>15</sup> most experts conclude that none of these treatment modalities for Bartholin cysts and abscesses appear to be superior over another with respect to recurrence rates and success.<sup>9,12</sup> The same conclusion was reached in a prospective trial that compared the recurrence associated with Word catheterization with that associated with marsupialization.<sup>16</sup> Therefore, novel effective treatment procedures are needed. Here, we describe a surgical technique that involves the combination of radiofrequency ablation (RFA) with a needle-like knife electrode to fistulize Bartholin duct cysts and gland abscesses approaching treatment.

## Methods

RFA is a proven technique and has been used for local target tissue ablation in various diseases.<sup>17, 18</sup> We demonstrate a novel surgical technique: RFA fistulization using a specially designed sharp needle-like electrode with a head end (3x12 mm) and a fully insulated body portion (8x20 mm). The main RFA engine is BBT-RF-B (Banbiantian Co., Wuhan, China), which is compliant with state standards and functions in China, with a working frequency of  $550 \pm 50$  kHz and an efferent power of 0-60 W. After preliminary tests in the laboratory to optimize the working frequency and efferent power, we identified a power of 30 W to 40 W and a duration of  $20 \pm 5$  seconds as optimal parameters for single-point RFA fistulization. All patients receiving the treatment were followed up with a gynaecological examination and evaluated for pain with a 10-point visual analogue scale (VAS) score before treatment and at 1, 2, 3 and 7 days after treatment. All patients were re-examined at 1, 3 and 12 months after treatment. Recurrence was assessed within 12 months.

### Technique

The procedure was performed as follows (Figure 1 and video). First, we identified the location of the RFA fistulization, which is commonly located at the pronaus and the thinnest part in the capsule wall of the cyst or abscess. Then, the head end of the electrode was placed for puncture and ablation. The second step involved ablation of the fistulization tissue and drainage. When the head end of the electrode was inserted through the capsule wall slowly into the cavity of the cyst or abscess, ablation was performed for 20 to 30 seconds to generate a coagulation zone and an orifice of 4-5 mm in diameter. Then, we ablated around the lesion with additional single-point ablation to expand the coagulation zone around the prior orifice. As a result, an outflow tract (approximately 6-7 mm in diameter) at the centre of the coagulation zone was formed. Finally, we confirmed complete drainage and flushed the operating field.

## Results

A total of 12 patients were treated with RFA fistulization at our institute between April 2016 and October 2018. At 3-7 days postoperation, the mucus membrane around the new outflow tract showed three clearly defined areas: a defect region in the centre, a region of coagulation necrosis around the defect, and a region of hyperaemia at the periphery (Figure 2 A). The necrotic tissue was exfoliated at the 30-days postoperation re-examination. During this period, patients generally experienced a small amount of bloody discharge. One month postoperation, the mucus membrane around the new outflow tract was formed, and no residual scarring was observed (Figure 2 B). Three months postoperation, the new outflow tract showed a good aesthetic effect (Figure 2 C, D). All patients recovered from pain, mass, erythema and oedema in the vulvar region and returned to normal living at 24 hours postoperation. Pain scores, operation times and patient outcomes were recorded (Table 1).

## Discussion

We described a novel surgical procedure that can be used to treat Bartholin gland cysts or abscesses in which RFA is used to create a new outflow tract (instead of the original duct orifice). With this technique, the Bartholin gland is conserved, and gland function is maintained. In our series of 12 patients, the RFA

fistulization procedure was demonstrated to be extremely simple and caused minimal intraoperative and postoperative patient discomfort. All patients recovered in the short term. There were no complications or cases of recurrence needing surgery within 1 year. The aesthetic results were also highly satisfactory. Only one patient developed a recurrent infection 11 months after RFA treatment that was successfully treated with clarithromycin. Of course, the long-term results of this technique need to be further investigated.

In RFA, the biothermal effects induce different degrees of damage to local tissue. Immediately around the electrode tip, the tissue is mechanically punctured and charred to form a new outflow tract. Furthermore, the tissue around the electrode is charred and sloughed off within a few days, leaving a local tissue defect through which the cyst contents are drained. Around the defect region, there is an area of coagulation necrosis, and this region will slough off gradually. Around the region of coagulation necrosis is an area of hyperaemia. Slight heat damage is noted in this region, which eventually returns to normal. After one to three months, an outflow tract with a proper shape and size is formed.

There are several advantages to the RFA fistulization procedure described here. First, gland function is preserved. Second, suturing is not needed to stop bleeding during surgery. Third, the mucus membrane around the new outflow tract helps keep it open and prevent obstruction recurrence.

Some factors require particular attention during RFA fistulization. First, the ablation point should be at the thinner, lower position of the cyst wall; an outflow tract in this region will allow better drainage. Second, the electrode tip should not be inserted more than 12 mm into the cavity to prevent damage to the cyst wall from adhesions. It should also be noted that RFA fistulization has limitations when the lesion is deeply located or relatively small (diameter <20 mm). In such a case, accurate positioning of the electrode is difficult, and there is risk of damaging surrounding normal tissue.

## **Conclusion**

The treatment of Bartholin duct cysts and gland abscesses with RFA fistulization is a novel and minimally invasive surgical technique

## **Disclosure of interests**

None declared.

## **Contribution of authorship**

All authors were involved in carrying out the study and conceptualizing the report. GT design and finished the surgical procedure. XC and GT drafted the manuscript and reviewed by GT. XC, YZ contributed to clinical data.

## **Details of ethics approval**

This was approved by the Medical Ethics Committee in the Second Xiang Ya hospital of Central South University, China. Protocol number: S083.

## **Funding**

There was no funding for this publication.

## **Acknowledgments**

We thank Banbiantian Co. for the generosity of free custom manufacturing of the special needle-like knife electrode for radiofrequency ablation.

## **Supporting Information**

Additional Supporting Information may be found in the online version of this article:

Video. RFA fistulization treatment of Bartholin's gland cysts and abscesses has been granted by those featured in the video.

## REFERENCES

1. Omole F, Simmons BJ, Hacker Y. Management of Bartholin's duct cyst and gland abscess. *American family physician*. 2003;68(1):135-140.
2. Marzano DA, Haefner HK. The bartholin gland cyst: past, present, and future. *Journal of lower genital tract disease*.2004;8(3):195-204.
3. Pundir J, Auld BJ. A review of the management of diseases of the Bartholin's gland. *Journal of obstetrics and gynaecology : the journal of the Institute of Obstetrics and Gynaecology*.2008;28(2):161-165.
4. Te Linde RW. Operative Gynecology Textbook. Philadelphia, PA: J.B. Lippincott Company; 1953. pp. 734.
5. Wilder EM. A simple method of treating vulvovaginal (Bartholin) cyst and abscess. *South Med J* 1955; 48:460–5.
6. Kessous R, Aricha-Tamir B, Sheizaf B, Steiner N, Moran-Gilad J, Wein-traub AY. Clinical and microbiological characteristics of Bartholin gland abscesses. *Obstet Gynecol*. 2013;122: 794–9.
7. Frega A, Schimberni M, Ralli E, Verrone A, Manzara F, Schimberni M, et al.  
Complication and recurrence rate in laser CO2 versus traditional surgery in the treatment of Bartholin's gland cyst. *Arch Gynecol Obstet* (2016) 294:303–309.
8. Fambrini M, Penna C, Pieralli A, Fallani MG, Andersson KL, Lozza V, Scarselli G, Marchionni M (2008) Carbon-dioxide laser vaporization of the Bartholin gland cyst: a retrospective analysis on 200 cases. *J Minim Invasive Gynecol* 15(3):327–331
10. Cardaillac C, Dochez V , Gueudry P , Vaucel E , Ploteau S , Winer N , et al.  
Surgical management of Bartholin cysts and abscesses in French university hospitals. *J Gynecol Obstet Hum Reprod*. 2019 Mar 29. pii: S2468-7847(19)30027-3.
11. Gennis P, Li SF, Provataris J, et al. Jacobi ring catheter treatment of Bartholin's abscesses. *Am J Emerg Med*. 2005; 23(3):414-415.
12. Wechter ME, Wu JM, Marzano D, Haefner H. Management of Bartholin duct cysts and abscesses: a systematic review. *Obstetrical & gynecological survey*. 2009;64(6):395-404.
13. Kafali H, Yurtseven S, Ozardali I. Aspiration and alcohol sclerotherapy: a novel method for management of Bartholin's cyst or abscess. *Eur J Obstet Gynecol Reprod Biol*. 2004;112(1):98–101.
14. Lee MY, Dalpiaz A, Schwamb R, Miao Y, Waltzer W, Khan A. Clinical Pathology of Bartholin's Glands: A Review of the Literature. *Current urology*. 2015;8(1):22-25.
15. Vincent Boama and Joanne Horton. Word balloon catheter for Bartholin's cyst and abscess as an office procedure: clinical time gained. Boama and Horton *BMC Res Notes* (2016) 9:13-16.



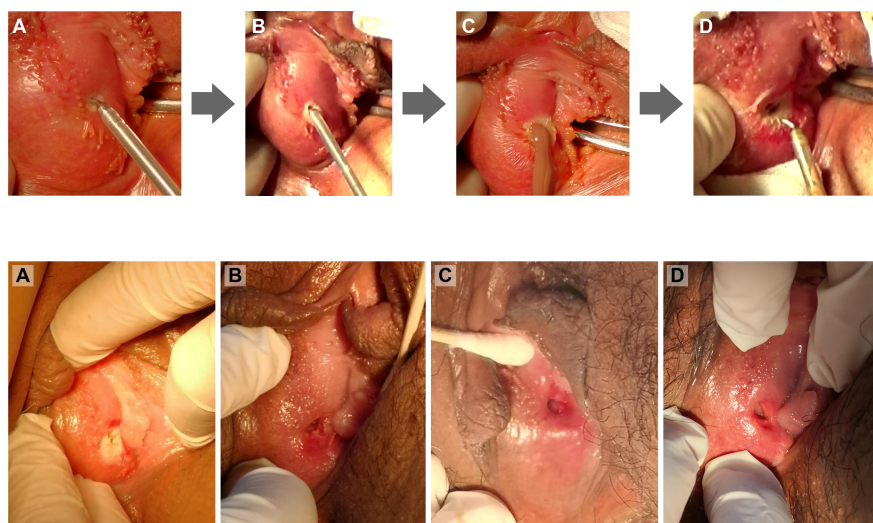
16. Kroese JA, van der Velde M, Morssink LP, Zafarmand MH, Geomini P, van Kesteren PJM, et al. Word catheter and marsupialisation in women with a cyst or abscess of the Bartholin gland (WoMan-trial): a randomised clinical trial. *BJOG* 2017;124:243–249.
17. Penninx JP, Mol BW, Engels R, van Rumste MM, Kleijn C, Koks CA, et al. Bipolar radiofrequency endometrial ablation compared with hydrothermablation for dysfunctional uterine bleeding: a randomized controlled trial. *Obstetrics and gynecology*. 2010;116(4):819-826.
18. Sucandy I, Cheek S, Golas BJ, Tsung A, Geller DA, Marsh JW. Longterm survival outcomes of patients undergoing treatment with radiofrequency ablation for hepatocellular carcinoma and metastatic colorectal cancer liver tumors. *HPB : the official journal of the International Hepato Pancreato Biliary Association*. 2016;18(9):756-763.

## FIGURE LEGENDS

### Figure 1. Workflow of RFA Fistulization Surgery.

A. Step 1: Local anesthesia, location of the ablation point and ablation. B. Step 2: Puncture and expansion of RFA fistulation to form a new outflow tract. C. Step 3: Drainage of pus or cyst fluid. D. A new outflow tract or orifice fistulae past surgery.

### Figure 2. Newly Outflow Tract of Bartholin Duct Cyst After RFA Fistulization Surgery. A. 5 days postoperation. B. 30 days postoperation. C. 60 days postoperation. D. 90 days postoperation.



## Hosted file

20200317 table 1-submit to BJOG .docx available at <https://authorea.com/users/304721/articles/435277-application-of-radiofrequency-ablation-fistulization-to-treat-bartholin-duct-cysts-and-gland-abscesses-a-minimally-invasive-surgical-technique>